

Notice of Allowability

Application No.

09/659,948

Examiner

Herng-der Day

Applicant(s)

ANTONY, RICHARD T.

Art Unit

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendments received 4/11/07 and 6/21/07.
2. ☒ The allowed claim(s) is/are 21-30, now renumbered as 1-10.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f):
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 20070625.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


KAMINI SHAH
SUPERVISORY PATENT EXAMINER

DETAILED ACTION

1. This communication is in response to Applicant's Reply to Office Action dated January 12, 2007, filed April 11, 2007, and telephone interview conducted June 25, 2007.
- 1-1. Claims 41-50 have been added and canceled. Claims 31-40 have been cancelled. Claims 21 and 26 have been amended. Claims 21-30 are pending.
- 1-2. Claims 21-30 have been examined and allowed.

Drawings

2. The replacement drawings of FIGs. 1-30 received on April 11, 2007 is acceptable. The objection to the drawings has been withdrawn.

EXAMINER'S AMENDMENT

3. An Examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to Applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.
4. Authorization for this Examiner's amendment was given in a telephone interview with Mr. Michael J. Dimino (Reg. No.: 44,657) on June 25, 2007.
5. The claims have been amended as follows:
 - 5-1. Replace claim 21 as follows:

21. (currently amended) A method for performing Boolean operations locating a geographical region using in a digital computer, where the located region is the result of a Boolean operation

Art Unit: 2128

among a first geographical region and a second geographical region, where the regions ~~and the result of the operation~~ are represented as vector tuples, the method comprising:

- establishing indexing cells about the regions;

- classifying each indexing cell by the type of interaction between the regions, where the type of interaction includes (boundary, boundary), a (boundary, boundary) indexing cell containing a portion of the boundary of each region;

- for each (boundary, boundary) indexing cell:

- defining a pseudo-point at each entrance of each region boundary to the cell and each exit from the cell of each region boundary;

- categorizing the (boundary, boundary) indexing cell based on a relationship of its pseudo-points;

- identifying at least one starting point along the boundary of one of the regions based on:

- the categorization,

- a Boolean operation to be performed, and

- the interior convention of the vector tuples representation;

- accumulating result tuples, including tuples including pseudo points and

- intersections between region boundaries, encountered in tracing a cycle:

- from a first at least one starting point, along the first starting point region boundary; in the direction of the first starting point region boundary; and returning to the first starting point, wherein:

- upon encountering each intersection the cycle proceeds along the other region boundary, in the direction of the other region boundary,

Art Unit: 2128

upon encountering a cell edge the cycle proceeds along the cell edge in the direction consistent with the interior convention of the vector tuple representation, and

until the cycle is completed at the first starting point;

upon completing a cycle where at least one of a starting point remains untraversed or an intersection between region boundaries remains untraversed, accumulating result tuples, including tuples including pseudo points and intersections between region boundaries, encountered in tracing a cycle: from a subsequent starting point at the first untraversed starting point or untraversed intersection between region boundaries along the subsequent starting point region boundary, in the direction of the subsequent starting point region boundary, and returning to the subsequent starting point, wherein:

upon encountering each intersection the cycle proceeds along the other region boundary, in the direction of the other region boundary,

upon encountering a cell edge the cycle proceeds along the cell edge in the direction consistent with the interior convention of the vector tuple representation, and

until the cycle is completed at the subsequent starting point; and

discarding duplicate tuples and tuples comprising only cell edges, until all starting points and intersections of the region boundaries have been traversed; and

displaying the located region as defined at least in part by the accumulated result tuples.

5-2. Replace claim 26 as follows:

26. (currently amended) A computer program product for ~~performing Boolean operations among~~ locating a geographical region as a product of a Boolean operation between a first geographical region and a second geographical region, where the regions and the result of the

Art Unit: 2128

operation are represented as region quadtree-indexed vector tuples, the computer program product comprising:

- a computer readable medium;

- an indexing module stored on the medium and operable for:

 - establishing indexing cells about the regions

- a classifying module stored on the medium and operable for:

 - classifying each indexing cell by the type of interaction between the regions, where the type of interaction includes (boundary, boundary), a (boundary, boundary) indexing cell containing a portion of the boundary of each region;

- a definition module stored on the medium and operable for:

 - defining a pseudo-point at each entrance of each region boundary to the cell and each exit from the cell of each region boundary in each (boundary, boundary) indexing cell;

- a categorization module stored on the medium and operable for:

 - categorizing the (boundary, boundary) indexing cell based on a relationship of its pseudo-points;

- an identification module stored on the medium and operable for:

 - identifying at least one starting point along the boundary of one of the regions for each (boundary, boundary) indexing cell based on:

 - the categorization,

 - the Boolean operation, and

 - the interior convention of the vector tuples representation;

- an accumulation module stored on the medium and operable, for each (boundary, boundary) indexing cell, for:

accumulating result tuples, including tuples including pseudo points and

intersections between region boundaries, encountered in tracing a cycle:
from a first at least one starting point, along the first starting point region
boundary; in the direction of the first starting point region boundary; and
returning to the first starting point, wherein:

upon encountering each intersection the cycle proceeds along the
other region boundary, in the direction of the other region
boundary; and

upon encountering a cell edge the cycle proceeds along the cell
edge in the direction consistent with the interior convention
of the vector tuple representation;

until the cycle is completed at the first starting point;

upon completing a cycle where at least one of a starting point remains untraversed
or an intersection between region boundaries remains untraversed,
accumulating result tuples, including tuples including pseudo points and
intersections between region boundaries, encountered in tracing a cycle:
from a subsequent starting point at the first untraversed starting point or
untraversed intersection between region boundaries along the subsequent
starting point region boundary, in the direction of the subsequent starting
point region boundary, and returning to the subsequent starting point,
wherein:

upon encountering each intersection the cycle proceeds along the
other region boundary, in the direction of the other region
boundary, and

upon encountering a cell edge the cycle proceeds along the cell
edge in the direction consistent with the interior convention
of the vector tuple representation;

until the cycle is completed at the subsequent starting point, and

Art Unit: 2128

discarding duplicate tuples and tuples comprising only cell edges, until all starting points and intersections of the region boundaries have been traversed-
and
a display module stored on the medium and operable, for each (boundary, boundary)
indexing cell, for
displaying the located region as defined at least in part by the accumulated result
tuples.

5-3. Cancel claims 31-50.

Reasons for Allowance

6. The following is an Examiner's statement of reasons for allowance:

6-1. The closest prior art of record discloses:

(1) A method for performing Boolean operations on geometric objects (Ernst, U.S. Patent 5,649,084).

(2) A method for performing polygon set operations on polygonal regions (Covey et al., U.S. Patent 5,818,460).

(3) Principles of data fusion automation (Antony, "Principles of Data Fusion Automation").

6-2. The prior art does not expressly teach or render obvious the invention as recited in independent claims 21 and 26.

Performing Boolean operations on geometric objects and polygonal regions are uncovered in the prior art. However, the specific steps regarding accumulating result tuples encountered in tracing a cycle from a starting point was not uncovered in the prior art teachings.

Art Unit: 2128

Moreover, as the courts have held that “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) and “The identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. In *re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Nor was a reference uncovered that would have provided a basis of evidence for asserting a motivation that one of ordinary skill in the art at the time the invention was made, knowing of the environment of locating a geographical region by performing boolean operations, would have applied the specific steps as recited in the context of the independent claims 21 and 26. Therefore, independent claims 21 and 26 have been allowed over the prior art of record.

Dependent claims are allowed as they depend upon allowable independent claim.

7. Any comments considered necessary by Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Art Unit: 2128

Conclusion

8. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day
June 25, 2007

H.D.

KAMINI SHAH
SUPERVISORY PATENT EXAMINER
SUPERVISORY PATENT EXAMINER
KAMINI SHAH